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ABSTRACT

This paper summarizes several research studies related to reading and writing disabilities in children. The major purpose of these investigations was to test some of the German theories on dyslexia, especially regarding visual perceptual problems, spatial orientation, and dominance factors. The dyslexic child, as defined in Germany and used in this study, is a child with reading and writing disabilities who possesses normal intelligence. Children with and without reading and writing problems were matched according to IQ, sex, age, grade level, and occupation of father, and were then compared in visual perception, dominance factors, and spatial orientation. Dyslexic children were found to be inferior in articulation, auditory discrimination, and vocabulary, but they did not differ in grammatical structure of oral language and in concept formation. The interpretation of findings suggests that home variables and early parent-child interactions bear relevance for reading and writing problems. Remedial education considering specific personality traits of dyslexia, such as non-directive play therapy, was found to be successful. (WR)

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REPORT OF RESEARCH ON DYSLEXIA IN CHILDREN

Paper presented at the International Reading Association

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This paper summarizes some research studies of the author carried out between 1967 and 1971. The major purpose of these investigations was to test some of the current German theories on dyslexia especially regarding visual perceptual problems, spatial orientation and dominance factors. In the course of the studies other questions arose concerning the socio-cultural level of the home environment, personality and motivational factors as well as auditory and language skills.

Reviewing the vast German literature of the last 20 years on dyslexia (the term is used here as a synonym for reading and writing disabilities in children with normal intelligence), one is astonished to find how little empirical evidence has been offered. Nevertheless, the views about the nature and origin of dyslexia are clear-cut. Some of the often repeated hypotheses are the following:

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- The main characteristic of dyslexic children is a directional confusion resulting in reversal errors in reading and writing and in a disability to distinguish right and left.
- Dyslexia is related to deficiencies in visual perception and to dominance factors such as left-handedness, left-eye dominance and crossed dominance.
- Dyslexia is an innate, congenital failure and relatively unaffected by environmental influences.

The results of the rare empirical studies were in themselves controversial and for the most part inconsistant with findings reported in other countries [for instance, (9) and (19)] that are generally ignored by German speaking authors. The discrepancy of the results seems to have been due to certain methodological weaknesses of the studies: smallness and heterogenity of the sample; complete lack of control groups or lack of adequate control groups so that the relevant variables such as intelligence, age, sex, and socio-economic status had not been controlled; futhermore, most of the subjects were clinical cases with uncertain selection biases. In order to prevent these methodological deficiencies, the author's own investigations were planned with children of the normal school population (preventing selection effects) and with matched samples controlling IQ, age, grade level, sex and occupation of the father. The different studies carried out will be described below. Since the space limit does not allow a thorough discussion of all findings and a detailed comparison with data reported by other authors, only short references to the literature will be made. For details see (17) and (18).

Investigation 1. The purpose of this study was to test some current German theories regarding the role of visual perception, spatial orientation and dominance factors. The sample consisted of 100 matched pairs of dyslexic and non-dyslexic children of grades two and three. The mean IQ of both groups was 105. Criteria for dyslexia were an IQ>90 in a Picture Intelligence Test (Bildertest) and a PR<5 in a spelling test. The control group showed a PR>50 in the spelling test. Standardized reading measures could not be used since at the time of the investigation, no group reading test existed in Germany. But the dyslexics were also found to be significantly inferior in informal reading tests. In tests of visual perception (Wechsler-Hagin-Lamb-Chop-Test, "Memory for Figures" by Kramer and the Coding-subtest of the WISC) no differences were observed between the two groups. The dyslexic children exceeded the normal readers in the Thurstone-Perceptual-Speed-Test, a phenomenon which had also been observed by other German authors (7).
In the Benton Visual Retention Test nearly all poor readers performed as well as would be expected from their age and intelligence.
Only 7% of the dyslexics showed deficiencies in this test (perhaps caused by minimal brain damage) and they were also significantly inferior in the other visual tests administered. In general the data suggest that dyslexia is not related to insufficiencies in visual perception at this age level at least as far as form perception and perceptual speed are concerned. Only a small proportion of dyslexic children taken from a normal school population seems to have visual perceptual problems which may indicate a brain dysfunction.

At first sight these results appear to be inconsistent with Malmguist's findings (9); he observed significant differences in five visual tests between normal and poor readers in grade one. But a re-analysis of his data indicate that these differences disappear when only poor readers of normal intelligence are considered. When intelligence is parceled out the correlation between the reading test scores and the visual test scores tends to approach zero. These findings suggest that the differences in visual perception which have occasionally been found between normal and retarded readers are due to an unsufficient control of intelligence. This hypothesis has already been found by Benton(3).

That visual perceptual problems are of minor importance for dyslexia is further confirmed by the findings of a predictive study with two samples of first grade children. The Frostig Developmental Test of Visual Perception administered during the first weeks of school showed only a small degree of relationship between the results obtained and the reading and spelling abilities tested one year later. Frostig's claim that low scores in this test are a good predictor of reading failure could not be supported. Low test scores indicated in nearly all cases an IQ below average but were of no value in predicting reading disabilities (18).

Though low reliability coefficients of the Frostig subtests might have contributed to these results, the findings are also in accordance with the view that when entering school, nearly all children (including most of the dyslexics) have reached the minimum level of visual perceptual abilities which are necessary for learning to read.

The study further examined the relationship of dyslexia to reversals in reading, directional confusion in form perception and right-left-disorientation. The dyslexic children showed absolutely more

reversals and translocations in a word recognition test, but relative to the total amount of errors, they made significantly less of these errors. That good readers make relatively more reversals in reading was also observed by Lobrot (8) and Tordrup (16). Compared with normal readers the percentage of letter omissions and of confusions of vowels and consonants was greater among the dyslexic group. No differences were found in the Lamb-Chop-Test and another spatial orientation test (subtest of the Bildertest). The results of two Right-Left-Discrimination-Tests showed that the retarded readers had no difficulties in discriminating right and left accurately in a paper-and-pencil test (Rey-Test) and no problems in identifying right and left on their own bodies (Piaget-Head-Test). Like the normal readers they showed difficulties in recognizing the lateral schema of other persons and in locating objects in the room. Results reported by Coleman and Deutsch (5) are in agreement with these findings.

The scores of the reading, the visual and the spatial tests were intercorrelated separately for the two groups. In each case a Principal Components Analysis was carried out with rotation to varimax criterion. Four factors were found (for details see 18), the reading factor having nearly zero correlations with the visual and spatial tests. The factor structure of the two groups as compared with a method of Fischer-Roppert was similar. Thus, the results of the factor analytic study substantiate the results already obtained by comparing the means of the two groups.

Hand and eye dominance was assessed by the Harris Tests of Lateral Dominance and the Miles A-B-C Vision Test of Ocular Dominance. Ten children of the dyslexic and 11 of the control group were found to be lefthanders. In both groups a nearly similar percentage of children with left-eye dominance (ca. 38%) and crossed dominance (36%) were observed. Children with hand or eye dominance on the left side did not show greater spatial disorientation with regard to reversal errors and right-left-confusion as it has often been claimed in German literature. These data strongly suggest that there is no definite relationship between spatial orientation, laterality and reading. This is in accord with various other investigations, for instance Balow and Balow (1), Capobianco (4) and Tinker (15), which are still widely ignored in German literature. The fact that in some studies with clinical samples a higher percentage of lefthanders has been found seems to be caused by a selection effect. In view of these findings which are supported by another study in 16 classes (18) and because of the highly speculative theory of Orten (the questionable concept of the mirrored representation of engrams in both hemispheres), dominance factors should be neglected in the diagnosis and the etiology of reading failure.

Investigation 2. This study explored the question of whether there exists a relationship between dyslexia and certain social and cultural variables of the home environment. The existence of such a correlation is denied by many German speaking authors (13, 20), since dyslexia is conceived as a congenital failure.

Data were collected by means of a standardized personal interview with parents in the respective homes. The sample consisted of the parents of 50 dyslexics and 50 normal readers of the above described sample. With regard to early childhood no relation was found between dyslexia and physical and motor development, birth injuries, childhood diseases and visual and auditory defects. But the control group showed speech defects to a significantly lesser degree. The subjects had been paired for occupation of the father in order to minimize the influence of social class. Nevertheless, the interview revealed many significant differences with regard to the socio-cultural level of the home. Mothers of good readers had a better education, had more often been trained for a job and were more often employed in a qualified occupation. A significant relationship was obtained between dyslexia and the number of rooms in the home and the number of books and newspapers read in the family. Furthermore, there was a significant correlation to the number of children in the family and to birth order. The frequency of only children and of first children was statistically higher in the group of normal readers. Dyslexic children belonged more often to the later borns, though not to the youngest children. The data justify the conclusion that the majority of children with reading problems have less favorable home conditions. This view is in accordance with results of Malmquist (9), Milner (10), Morris (44), and Sheldon and Carillo (14) and also with a recent representative study of Niemeyer (12) who found that nearly 80% of dyslexics were working class children.

The design of this correlational study does not furnish any definite information regarding the causes of reading and writing disabilities. But the fact that significant relations exist between dyslexia and the home environment served as basis for further research. It was hypothesized that intervening variables such as emotional and motivational factors on the one side, and speech and language factors on the other side could be fruitful explanation for the correlation between reading failure and home conditions.

Investigation 3. This study examined the major hypothesis that in view of the great number of dyslexics from poor socio-cultural background, a lack of achievement motivation could be one cause of poor reading ability. The sample consisted of 22 pairs of dyslexic and normal children out of a third grade normal school population which were paired individually for IQ, sex, age and occupation of the father. Children were considered to be dyslexic when their reading and spelling achievement was below -1 sigma and their IQ>90. The control group showed at least average reading and writing abilities. Nearly all children came from lower classes. In the Thematic Apperception Test (McClelland) the good readers scored higher in the motive to approach success, the poor readers were found to be more failure motivated and also more anxious as an Anxiety-Test indicated. To measure field-independence which is related with personality variables such as dominance, initiative and self-confidence an Embedded Figure Test was administered. As it was hypothesized the test differentiated between the two groups. It is well established within the socialisation theory that achievement motivation and field-independence are influenced by early parent-child interactions. In order to examine whether such a relationship

could also be found in this sample a questionnaire of Winterbottom (21) was used. This is an interview method for obtaining information from the mothers about their expectations concerning early independence and mastery training of their children. Mothers of good readers manifested attitudes which fostered independence and autonomous decisions of their children, while mothers of dyslexics appeared to be overprotective. Answers regarding the aims of childrearing indicated that mothers of good readers pleaded for a child-centered independence while mothers of retarded readers fostered the social adjustment and submission of their children. In view of the smallness of the sample, the possibly low validity of the questionnaire and because of the ex-post-facto design of this study caution is needed in interpreting these findings. But it seems pausible to conclude that the observed personality traits of the dyslexics (low achievement motivation, anxiety, field-dependence) are not only reactions to the reading failure but might also be in some cases contributory to dyslexia.

Investigation 4. This study based on the same sample of 22 matched pairs of normal and retarded readers explored some hypotheses concerning speech and language factors. It was presumed that the unfavorable home conditions (crowded and noisy environment, poor imitation models for speech) inhibit the development of auditory and language skills. As predicted dyslexics scored significantly lower on tests of auditory discrimination and articulation. They were equally inferior in analysing words into sounds but this did not hold true for syllables. Auditory memory was deficient with regard to a series of sounds and words while the memory for digit span as measured by the WISC-subtest was normal. Thus, it appears that the poor auditory memory is limited to the speech sector. It remains an open question whether the poor

auditory memory deficiencies were due to a poor memory or due to poor auditory discrimination since the children mainly failed when acoustically similar words were used as a stimuli in the memory tests. Other language abilities were assessed by a Vocabulary Test (WISC), a Concept Formation Test (Bruner) and the Verbal Expression Test of the ITPA. Only the Vocabulary Test yielded significant differences. A vocabulary subtest analysis confirmed the results reported by Belmont and Birch (2). Though the differences did not reach statistical significance there was a tendency that poor readers were familiar with fewer words than were the normal readers and that the quality of the definitions offered by the children was different. The dyslexics gave a larger percentage of descriptive and a lower percentage of categorical definitions. The frequency of functional definitions was equal in both groups. A further analysis of the oral speech produced in the TAT failed to find reliable differences. Both groups scored equally in the following measures: length of utterance, length of sentences, number of subordinations, number of nouns, verbs, adjectives and conjunctions. There was a slight tendency for normal readers to produce more subordinations of a second and third order, but in general no differences in the grammatical structure of oral language were observed between the groups. On the basis of this study it seems that only the more fundamental level of language, i.e. auditory skills and articulation, are deficient in many dyslexics.

Conclusions. These studies do not support the claim that dyslexia is a congenital failure and is caused by a single factor. Though only a few aspects have been considered the data are consistent with the view that dyslexia has a variety of correlates and causes. These

investigations stressed the point that in many children reading disability seems to be a learning disorder due to deficiencies in auditory discrimination, articulation and achievement motivation. In view of these findings a revision of current remedial methods concerned mainly with visual-perceptual and spatial training is desirable. A systematic preschool education together with a training of auditory and speech skills could be helpful in many cases. A promising approach to remedial education is a method such as non-directive playtherapy [as it has been shown by Detzkies (6)] which takes into account the specific personality traits of dyslexic children.

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